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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
DIAMOND, ALAN D	

ART UNIT	PAPER NUMBER
1753	

DATE MAILED: 09/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/788,339	TSUGE, SADAJI	
	Examiner	Art Unit	
	Alan Diamond	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 July 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *9-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *9-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on July 6, 2006 has been entered.

Improper Amendment and Numbering of Claims

2. Please note that claims numbered 6-8 have previously appeared in the instant application and were cancelled. Note, for example, in the Amendment of 12/14/2005, claims 6-8 have been indicated as "canceled". Accordingly, the amendment filed July 6, 2006 is improper since the claim numbering is incorrect, and the newly presented claims 6-12 in the amendment of July 6, 2006 should have been numbered as 9-15; and claims 1-8 should be listed with the new claims as being canceled.

3. The numbering of claims is not in accordance with 37 CFR 1.126 which requires the original numbering of the claims to be preserved throughout the prosecution. When claims are canceled, the remaining claims must not be renumbered. When new claims are presented, they must be numbered consecutively beginning with the number next following the highest numbered claims previously presented (whether entered or not).

Misnumbered claims 6-12 been renumbered 9-15, respectively. Accordingly, claims 9-15 are pending in the instant application.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 12 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 12 is indefinite because at lines 11-12, it is not clear where the intrinsic amorphous silicon layer, highly doped n-type amorphous silicon layer, transparent electrode and collector electrode are located. It is suggested that the semicolon after the word "member" at line 10 be deleted and then, line 11 be moved to the end of line 10 so that line 11 does not start a new paragraph. In this way it will be clear that the intrinsic amorphous silicon layer, highly doped n-type amorphous silicon layer, transparent electrode and collector electrode are located at the second surface.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 9-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP 11-307791 (herein referred to as JP '791) in view of Yamagishi et al (U.S. Patent 6,300,556), Brandhorst, Jr (U.S. Patent 4,131,486), and Spitzer (U.S. Patent 4,667,060).

JP '791 discloses a solar cell module comprising solar cells **1** encapsulated within a sealing resin **2**, and having a glass front surface side light transmitting member **3** (which is at the principal light incidence side) and a resin film rear surface member **4** (see Figure 1; and paragraphs 0023 and 0026-0028). Both the front surface side light transmitting member **3** and the rear surface member **4** transmit incident light (see Figures 1, 5, and 6). The sealing resin **2** is interposed between the front surface light transmitting member **3** and the solar cells **1** and is also interposed between the rear surface member **4** and the solar cells **1** (see Figure 1). With respect to the solar cell in JP '791's Figure 2, note in JP '791's paragraph 0024 that it is taught that on one principal plane of the crystalline silicon substrate **11**, there is laminated an i-type a-Si layer **12** and p-type a-Si layer **13**. It is also taught that on the principal plane on another side of the crystalline silicon substrate **11** there is laminated i-type a-Si layer **16** and n-type a-Si layer **17** (see paragraph 0024). The n-type a-Si layer **17** is depicted in Figure 2 as being continuous and uninterrupted, and corresponds to the instant continuous, uninterrupted highly doped n-type amorphous silicon layer. The term "highly doped" does not distinguish from JP '791's n-typed doped a-Si layer **17**, in the absence of some specific level of doping. It is acknowledged that JP '791's Figure 2 is a schematic. However, it would have been well within the skill of an artisan to make said n-type a-Si layer **17** continuous and uninterrupted because it is shown as being continuous and uninterrupted in said Figure 2, and so as to avoid short circuit of the solar cell **1**. The solar cell **1** has two transparent electrodes **14** and **18** at the top and bottom surfaces (see Figure 2; and paragraph 0024). These electrodes allow light to enter from both the

front and rear surfaces of the solar cell module (see Figures 1, 5, and 6). The rear surface member is formed of a transparent resin film (PET) (see Figure 1; and paragraph (0025)).

The solar cell module of JP '791 differs from the instant invention because JP '791 does not disclose that the front surface side light transmitting member contains sodium and that its p-i-n junction is formed with the crystalline substrate **11** and the thin film amorphous semiconductor layers **12, 13** such that the crystalline substrate **11** is formed between the thin film amorphous semiconductor layer **13** and the light incidence side light transmitting member **3**.

Yamagishi et al discloses the use of soda lime glass, which contains sodium, as a surface member (see col. 7, line 29). Soda lime glass is a conventional glass used in solar cell modules because it is inexpensive.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the solar cell module of JP '791 to use soda lime glass as the front surface member, as taught by Yamagishi et al, because soda lime glass is very inexpensive and provides excellent weather resistance. The selection of a known material based on its suitability for its intended use supported a *prima facie* obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See MPEP 2144.07.

Regarding the position of the crystalline substrate **11** with respect to the thin film amorphous layers **12, 13** and the light incidence side light transmitting member, the solar cell module of JP '791 allows light to enter from both sides (Figures 1, 5, and 6),

but the front surface side light transmitting member **3** is at the principal light incidence side (see paragraphs 0023 and 0026-0028). Therefore, light coming in from either direction contributes to the generation of electricity. Furthermore, with respect to the solar cell in JP '791's Figure 2, note in JP '791's paragraph 0024 that it is taught that on one principal plane of the crystalline silicon substrate **11**, there is laminated an i-type a-Si layer **12** and p-type a-Si layer **13**. It is also taught that on the principal plane on another side of the crystalline silicon substrate **11** there is laminated i-type a-Si layer **16** and n-type a-Si layer **17** (see paragraph 0024). JP '791 does not require said one principal plane on which the i-type a-Si layer **12** and p-type a-Si layer **13** to be the front face. JP '791 exemplifies the front face and recites "front face" in parenthesis for layers **12** and **13**, and exemplifies the rear face and recites "rear face" in parenthesis for layers **16** and **17** (see paragraph 0024; and Figure 2). However, JP '791 does not require layers **12** and **13** to be at the front surface and layers **16** and **17** to be at the rear face. Thus, a skilled artisan readily recognizes that the solar cell seen in Figure 2 of JP '791 can be placed in JP '791's module in Figure 1 with layers **12** and **13** at the front face (i.e., layers **12** and **13** closer to light transmitting member **3**) or at the rear face (i.e., layers **12** and **13** closer to rear surface member **4**). Such is the case because the solar cell in said Figure 2 can receive light from both sides (see Figure 1; and the first sentence of paragraph 0024). When said layers **12** and **13** are at the rear face, the p-i-n junction between layers **11**, **12**, and **13** is also at the rear face, and thus, the n-type crystalline silicon substrate **11** is between principal light transmitting member **3** and p-type a-Si layer **13**. Furthermore, the presence of a photovoltaic junction at the rear face

of a solar cell is well known in the art as shown by Brandhorst, Jr (Figures 2 and 4; and col. 1, line 60 through col. 2, line 25) and Spitzer (see Figure 1). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have prepared JP '701's solar cell module such that the solar cell in JP '791's Figure 2 is present in the module with the p-i-n junction between layers **11**, **12** and **13** at the rear face of the solar cell, and thus, the crystalline silicon substrate **11** is between principal light transmitting member **3** and p-type a-Si layer **13** because light can enter from both sides of JP '791's solar cell and thus, the p-i-n junction can be closer to either the light transmitting member **3** or the rear surface member **4**; JP '791 is not limited to layers **12** and **13** to be at the front surface; and the presence of a photovoltaic junction at the rear face of a solar cell is well known in the art as shown by Brandhorst, Jr and Spitzer. In other words, to take the solar cell in JP '791's Figure 2, flip it over it over, and then insert it into JP '791's Figure 1, would have been within the level of ordinary skill in the art because light can enter from both sides of JP '791's solar cell in Figure 2, and thus, the p-i-n junction can be closer to either the light transmitting member **3** or the rear surface member **4**; JP '791 is not limited to layers **12** and **13** to be at the front surface; and the presence of a photovoltaic junction at the rear face of a solar cell is well known in the art as shown by Brandhorst, Jr and Spitzer

8. Claims 9-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hanoka et al (U.S. Patent 6,353,042) in view of Yamagishi et al (U.S. Patent 6,300,556), JP 11-307791 (JP '791), Brandhorst, Jr (U.S. Patent 4,131,486), and Spitzer (U.S. Patent 4,667,060).

Hanoka et al disclose a solar cell module having a plurality of solar cells **22** encapsulated within a sealing material **10** (see Figure 2). A front surface light transmitting member **26** is made of glass and is at the principal light incidence side, and a rear surface member **28** is made of glass or a resin, such as Tedlar™, a transparent film (see col. 5, line 65 to col. 6, line 9). A transparent film would allow light to enter from both sides of the solar cell. The solar cells **22** may comprise crystalline or amorphous material and may be made of silicon or one of several other semiconductor materials (see col. 1 , lines 31-35; and col. 6, lines 19-59). Hanoka et al specifically discloses a module as shown in figure 2, "a solar cell module **20** in which the encapsulant material **10** encapsulates interconnected crystalline silicon solar cells **22**" (see col. 5, lines 55-57). Hanoka et al is silent on the details of the junction within the crystalline silicon solar cells **22**.

Hanoka et al discloses a front surface light transmitting member **26** is made of glass, and a rear surface member **28** is made of glass or a resin, such as Tedlar™, a transparent film (see col. 5, line 65 to col. 6, line 9). This structure permits light to enter from either side of the solar cell.

The solar cell module disclosed by Hanoka et al differs from the instant invention because Hanoka et al does not disclose the following:

a. The front surface member containing sodium.

b. The solar cell having an n-type crystalline silicon substrate.

c. The p-i-n junction is formed between the n-type crystalline substrate and the thin film i-type and n-type amorphous semiconductor layer such that

the n-type crystalline substrate is formed between the p-type thin film amorphous semiconductor layer and the light incidence side light transmitting member.

Yamagishi et al discloses the use of soda lime glass, which contains sodium, as a surface member (see col. 7, line 29). Soda lime glass is a conventional glass used in solar cell modules because it is inexpensive.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the solar cell module of Hanoka et al to use soda lime glass as the front surface member, as taught by Yamagishi et al, because soda lime glass is very inexpensive and provides excellent weather resistance.

JP '791 disclose a solar cell module comprising solar cells **1** encapsulated within a sealing resin **2**, and having a glass front surface side light transmitting member **3** (which is at the principal light incidence side) and a resin film rear surface member **4** (see Figure 1; and paragraphs 0023 and 0026-0028). Both the front surface side light transmitting member **3** and the rear surface member **4** transmit incident light (see Figures 1, 5, and 6). The sealing resin **2** is interposed between the front surface light transmitting member **3** and the solar cells **1** and is also interposed between the rear surface member **4** and the solar cells **1** (see Figure 1). With respect to the solar cell in JP '791's Figure 2, note in JP '791's paragraph 0024 that it is taught that on one principal plane of the crystalline silicon substrate **11**, there is laminated an i-type a-Si layer **12** and p-type a-Si layer **13**. It is also taught that on the principal plane on another side of the crystalline silicon substrate **11** there is laminated i-type a-Si layer **16** and n-

type a-Si layer **17** (see paragraph 0024). The n-type a-Si layer **17** is depicted in Figure 2 as being continuous and uninterrupted, and corresponds to the instant continuous, uninterrupted highly doped n-type amorphous silicon layer. The term "highly doped" does not distinguish from JP '791's n-typed doped a-Si layer **17**, in the absence of some specific level of doping. It is acknowledged that JP '791's Figure 2 is a schematic. However, it would have been well within the skill of an artisan to make said n-type a-Si layer **17** continuous and uninterrupted because it is shown as being continuous and uninterrupted in said Figure 2, and so as to avoid short circuit of the solar cell **1**. The solar cell **1** has two transparent electrodes **14** and **18** at the top and bottom surfaces (see Figure 2; and paragraph 0024). These electrodes allow light to enter from both the front and rear surfaces of the solar cell module (see Figures 1, 5, and 6).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the solar cell module of Hanoka et al to use a crystalline silicon substrate and an amorphous layer forming a heterojunction, as taught by JP '791, because the solar cell of JP '791 efficiently utilizes all of the light incident on both sides of the solar cell.

Regarding the position of JP '791's crystalline substrate with respect to JP '791's thin film amorphous layer and Hanoka et al's front surface light transmitting member **26**, Hanoka et al's module allows light to enter from both sides since both the front surface light transmitting member **26** and the rear surface member **28** are transparent, as noted above. Therefore, light coming in from either direction contributes to the generation of electricity. Furthermore, with respect to the solar cell in JP '791's Figure 2, note in JP

'791's paragraph 0024 that it is taught that on one principal plane of the crystalline silicon substrate **11**, there is laminated an i-type a-Si layer **12** and p-type a-Si layer **13**. It is also taught that on the principal plane on another side of the crystalline silicon substrate **11** there is laminated i-type a-Si layer **16** and n-type a-Si layer **17** (see paragraph 0024). JP '791 does not require said one principal plane on which the i-type a-Si layer **12** and p-type a-Si layer **13** to be the front face. JP '791 exemplifies the front face and recites "front face" in parenthesis for layers **12** and **13**, and exemplifies the rear face and recites "rear face" in parenthesis for layers **16** and **17** (see paragraph 0024; and Figure 2). However, JP '791 does not require layers **12** and **13** to be at the front surface and layers **16** and **17** to be at the rear face. Thus, a skilled artisan readily recognizes that the solar cell seen in Figure 2 of JP '791 can be placed in Hanoka et al's module in Figure 2 with layers **12** and **13** at the front face (i.e., layers **12** and **13** closer to light transmitting member **26**) or at the rear face (i.e., layers **12** and **13** closer to rear surface member **28**). Such is the case because the solar cell in JP '791's Figure 2 can receive light from both sides (see Figure 1; and the first sentence of paragraph 0024). When said layers **12** and **13** are at the rear face, the p-i-n junction between layers **11, 12**, and **13** is also at the rear face, and thus, the n-type crystalline silicon substrate **11** is between principal light transmitting member **26** of Hanoka et al and said p-type a-Si layer **13**. Furthermore, the presence of a photovoltaic junction at the rear face of a solar cell is well known in the art as shown by Brandhorst, Jr (Figures 2 and 4; and col. 1, line 60 through col. 2, line 25) and Spitzer (see Figure 1). It would have been obvious to one of ordinary skill in the art at the time the invention was made to

have prepared Hanoka et al's solar cell module such that the solar cell in JP '791's Figure 2 is present in the module with the p-i-n junction between layers **11**, **12** and **13** at the rear face of the solar cell, and thus, the crystalline silicon substrate **11** is between principal light transmitting member **26** of Hanoka et al and the p-type a-Si layer **13** because light can enter from both sides of JP '791's solar cell and thus, the p-i-n junction can be closer to either the light transmitting member **26** or the rear surface member **28**; JP '791 is not limited to layers **12** and **13** to be at the front surface; and the presence of a photovoltaic junction at the rear face of a solar cell is well known in the art as shown by Brandhorst, Jr and Spitzer.

Response to Arguments

9. Applicant's arguments filed July 6, 2006 have been fully considered but they are not persuasive.

Applicant cites the data of Tables 1 and 2 for unexpected results, and that continuous, unbroken, highly N doped, thick bulk layer is now claimed. However, this argument is not deemed to be persuasive because the conventional example in each of said Tables 1 and 2 does not represent a fair comparison with JP '791. In particular, said conventional example uses a lamination film of aluminum foil sandwiched with plastic films of PVF as the rear surface member (see paragraph 0043 and 0051). This contradicts JP '791, which uses a light-transmitting sheet (4) of, for example, PET at the rear surface, wherein said light-transmitting sheet (4) also scatters light. Furthermore, there is no aluminum foil at the rear surface of JP '791. The n-type a-Si layer **17** is depicted in Figure 2 as being continuous and uninterrupted, and corresponds to the

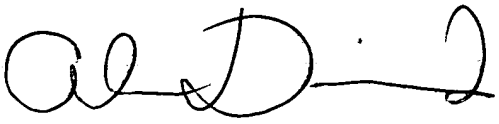
instant continuous, uninterrupted highly doped n-type amorphous silicon layer. The term "highly doped" does not distinguish from JP '791's n-typed doped a-Si layer **17**, in the absence of some specific level of doping. The term "thick bulk" does not distinguish from JP '791's n-typed doped a-Si layer **17**, in the absence of some specific thickness.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alan Diamond whose telephone number is 571-272-1338. The examiner can normally be reached on Monday through Friday, 5:30 a.m. to 2:00 p.m. ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Alan Diamond
Primary Examiner
Art Unit 1753



Alan Diamond
September 14, 2006